

66299

15.2220, 5.2400(A)

SOV/136-59-11-10/26

AUTHORS: Paderno, Yu. B., Serebryakova, T.I. and Samsonov, G.V.

TITLE: Production and Some Properties of Hafnium Boride

PERIODICAL: Tsvetnyye metally, 1959, Nr 11, pp 48-50 (USSR)

ABSTRACT: Considerable work has been carried out on titanium and zirconium borides. Little study has been made of hafnium boride, but preliminary investigations show it has even better properties. There is probably only one stable compound - the diboride with  $AlB_2$  type structure. It has been obtained by precipitation from the gas phase (Ref. 2.3). In the present work it was produced by the reduction of hafnium oxide by boron or boron carbide in a vacuum furnace. The relation of the free energy with temperature is -

$$\Delta F = 358.2 \times 10^3 - 175.05T$$

$$\Delta F = 91.9 \times 10^3 - 39.1T$$

for reduction by boron carbide and boron respectively. The reduction with carbide takes place at somewhat higher temperatures than with boron. At a pressure

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Production and Some Properties of Hafnium Boride

of  $10^{-1}$  mm mercury at 1300 to 1600°C, chemical analysis showed it was the stoichiometric diboride. X-ray analysis showed the cell to be  $a = 3.137$  and  $c = 3.469$  agreeing with the literature. Hot pressing was carried out at 2650° for 5 minutes with a load of 150 kg/cm<sup>2</sup>. The minimum porosity obtained was 15.1%. The electrical resistance of the compound was 8.8 microhm/cm agreeing with the literature when porosity is taken into account. The microhardness was 2900-500 kg/mm<sup>2</sup>. At temperatures above 650 to 700°C, an oxide film was formed on the compound. There are 15 references, of which 9 are Soviet, 5 English and 1 German.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN USSR  
(Institute of Metalloceramics and Special Alloys, Academy of Sciences, Ukrainian SSR)

Card 2/2

21(1)

AUTHORS: Paderno, Yu. B., Serebryakova, T. I. SOV/20-125-2-20/64  
Samsonov, G. V.

TITLE: The Compounds of Terbium With Boron and the Electron Configuration of the Atom of Terbium (Soyedineniya terbiya s borom i elektronnaya konfiguratsiya atoma terbiya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 2, pp 317-318 (USSR)

ABSTRACT: Hitherto, the compounds of nearly all rare-earth metals with boron, with the exception of promethium, terbium, and thulium, are known and have been sufficiently well investigated. Among them, the compounds of terbium with boron are of special interest because of the 2 possible variants of the electron structure of the terbium atom (which are described by the configurations  $4f^8 5d^1 6s^2$  or  $4f^9 6s^2$ ). The terbium- and boron compounds were produced by the reduction of terbium oxide by boron carbide  $Tb_2O_3 + 3B_4C = 2TbB_6 + 3CO$  and by boron  $Tb_2O_3 + 15B = 2TbB_6 + 3BO$  in accordance with previously

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The Compounds of Terbium With Boron and the Electron SOV/20-125-2-20/64  
Configuration of the Atom of Terbium

described methods (Refs 3, 4). In both cases the reduction took 1 hour at  $1650^{\circ}$ . The reduction with boron resulted in a blue-colored product, and its X-ray picture is characteristic of the hexaborides of the rare-earth metals with cubic lattice of the structural type  $O_h^1$ . According to the results obtained by calculating the intensities of X-ray reflections, this product was found to be terbium-hexaboride with the lattice period  $a = 4.11 \text{ \AA}$ . Reduction of the terbium oxide by boron carbide gave a greyish-brown product, viz.  $TbB_4$  with the identity periods  $a = 7.13 \text{ \AA}$  and  $c = 4.07 \text{ \AA}$  of the tetragonal lattice. The work function of the electrons in the thermoemission from  $TbB_6$  is  $\phi = 3.1 \text{ eV}$  and was determined by V. A. Trigubenko and B. M. Tsarev. This value corresponds to the dependence of the work function of the borides on the ordinal number of the rare-earth metals, which had been determined previously (Ref 2) assuming the electron structure

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The Compounds of Terbium With Boron and the Electron SOV/20-125-2-20/64  
Configuration of the Atom of Terbium

$4f^8 5d^1 6s^2$  of terbium. Thus, of the initially mentioned two structures, the last-mentioned is uniquely confirmed. The existence of the fsd - electron configuration indicates a considerable degree of binding of the electrons of terbium and boron in the sd-band of the hexaboride lattice. The existence of the borides  $TbB_4$  and  $TbB_6$  and their crystallo-chemical characteristics were for the first time determined by the authors. There are 2 tables and 6 references, 5 of which are Soviet.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii nauk USSR (Institute of Metal Ceramics and Special Alloys of the Academy of Sciences, UkrSSR)

PRESENTED: December 9, 1958 by S. A. Vekshinskiy, Academician

SUBMITTED: December 8, 1958

Card 3/3

SAMSONOV, G.V.; ZHURAVLEV, N.N.; PADERNO, Yu.B.; SHULISHOVA, O.I.  
SEREBYANCOVA, T.I.

Interaction of gallium, indium, thallium, germanium, tin, and  
lead with boron. Zhur. strukt. Khim. 1 no. 4:458-463 I-D '60.  
(MIRA 14:2)

1. Institut metallokeramiki i spetsial'nykh splavov AN USSR,  
Kiyev.

(Boron) (Metals)

S/051/60/008/03/026/038

E201/E191

AUTHORS: Serebryakova, T.I., Paderno, Yu.B., and Samsonov, G.V.

TITLE: The Emissivities of Powders of Some Refractory Compounds

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 3,  
pp 410-412 (USSR)

ABSTRACT: The authors report measurements of the emissivities of powders of borides, carbides and nitrides of refractory and rare-earth metals. Measurements were carried out with an instrument shown in a figure on p 410. This instrument simulated closely an absolute black body. A tantalum cylinder 5 (20 mm diameter, 50 mm height) served as a heater. Inside the cylinder 5 there was another smaller tantalum cylinder 6 (8 mm diameter, 20 mm height) which was placed concentrically with the cylinder 5. In each of the cylinders there was a small aperture and these apertures were aligned horizontally. The lower ends of the two tantalum cylinders were fixed to a molybdenum plate 4 which was pressed against the cylinder 5 by a spring. The whole instrument was enclosed in a glass bulb 1. The inner cylinder 6 was coated with 100  $\mu$  thick layer of paste prepared from a fine powder (particles of

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S/051/60/008/03/026/038

E201/E191

The Emissivities of Powders of Some Refractory Compounds

2-3  $\mu$  diameter) of the refractory material mixed with a binder. Temperature of the inner cylinder surface (the brightness temperature,  $T_b$ ) and temperature in the aligned apertures (the true temperature  $T_t$ ) were measured with an pyrometer OPPIR-09. Absorption in the glass bulb was found to be negligible. The emission intensities were measured at 650  $m\mu$  and the emissivities were calculated using the following formula:

$$\epsilon_n \epsilon_\lambda = \frac{c}{\lambda} \left( \frac{1}{T_t} - \frac{1}{T_b} \right)$$

where  $c = 1.438$  cm/deg and  $\lambda$  is the wavelength. The measured emissivities of pure tantalum at temperatures from 800 to 2000 °C agreed well with the published values (Table 1).

The measured emissivities of  $^{141}\text{LaB}_6$ ,  $^{141}\text{NdB}_6$ ,  $^{141}\text{SmB}_6$ ,  $^{141}\text{GdB}_6$ ,  $^{141}\text{YB}_6$ ,  $^{141}\text{ZrB}_2$ ,  $^{141}\text{HfB}_2$ ,  $\text{B}_4\text{C}$ ,  $^{141}\text{TiC}$ ,  $^{141}\text{Cr}_7\text{C}_3$  and BN powders at temperatures from 850 to 1650 °C are listed in Table 2. There are 1 figure, 2 tables and 6 references, of which 3 are Soviet, 2 English and 1 German.

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SUBMITTED: August 8, 1959

78209  
SOV/80-33-3-10/47

5.2100,5.2200

AUTHORS:

Samsonov, G. V., Serebryakova, T. I.

TITLE:

Preparation of Borides of Group IIA Metals

PERIODICAL:

Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 3,  
pp 563-569 (USSR)

ABSTRACT:

Borides of alkaline earth metals were obtained by the following methods: (a) Reduction of the metal oxides with boron carbides under vacuum; (b) combining boron directly with beryllium or magnesium; (c) reduction of the metal oxides with boron under vacuum. The laboratory vacuum oven with graphite heating element and the resistance oven used in (b) were described previously (ZL, 1953, Vol 19, p 243; ZhNKh, 1959, Vol 4, p 2759). The composition of the oven charges and the conditions of the reaction are given in Table 1. Methods (a), (b), and (c) applied to the Be-B system gave predominantly  $\text{Be}_2\text{B}$ , and also  $\text{BeB}_4$  which had the tetragonal structure analogous to that of  $\text{UB}_4$ , as well as  $\text{BeB}_6$  whose

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## Preparation of Borides of Group IIA Metals

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structure was not quite clear but definitely different from the structure of the hexaborides of Ca, Sr, and Ba.  $\text{BeB}_6$  was obtained with methods (b) and (c) but not with method (a). The reduction of  $\text{MgO}$  with boron under vacuum at  $1,300^\circ \text{C}$  gave a boride close to  $\text{MgB}_4$  (67.5% B found, as compared with 64% B calculated). A boride  $\text{MgB}_6$  (75.5% B found, 72.8% B calculated) formed at  $1,400^\circ \text{C}$ . As to hexaborides of Ca, Sr, and Ba, the highest yield was obtained in reactions 10, 13, 14 at  $1,600^\circ \text{C}$ ,  $1,600^\circ \text{C}$ , and  $1,500^\circ \text{C}$ , respectively. The hexaborides thus obtained had a practically stoichiometric composition. There are 3 tables; 3 figures; and 13 references, 1 French, 1 Danish, 11 Soviet.

ASSOCIATION: Institute of Metalloceramics and Special Alloys,  
Academy of Sciences USSR (Institut metallokeramini i  
spetsial'nykh splavov AN USSR)

SUBMITTED: August 24, 1959

Card 2/3

15.2240

27896

S/078/61/006/010/003/010

B101/B226

AUTHORS: Samsonov, G. V., Serebryakova, T. I., Bolgar, A. S.

TITLE: Synthesis and physicochemical properties of strontium hexaboride

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 10, 1961, 2243-2248

TEXT: The authors synthesized  $\text{SrB}_6$  by the reactions  $\text{SrO} + \text{B}_4\text{C} + 2\text{B} = \text{SrB}_6 + \text{CO}$  (I) and  $\text{SrO} + 7\text{B} = \text{SrB}_6 + (\text{BO})$  (II). Initial substances were SrO obtained by heating 96.37 %  $\text{SrCO}_3$  to 1250°C,  $\text{B}_4\text{C}$ , and 98.4 % B. The composition of briquetted charges corresponded to the reaction equations. They were heated to 1000-2000°C for 1 hr each. Then, their composition was analytically determined. Heating was conducted in an electric vacuum furnace. The pressure in the furnace was determined according to G. V. Samsonov (Ukr. khim. zhurn., 23, 287 (1957)). Reaction I showed a pressure increase at 1250°C caused by SrO reduction in which Sr evaporated. In the range of 1000-1200°C the reaction proceeds very slowly. In the range of 1500-1700°C, the  $\text{SrB}_6$  yield was only 60-70 % due to evaporation

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27596

S/078/61/006/010/003/010

B101/B226

Synthesis and physicochemical properties...

of Sr. In the range of 1800-2000°C,  $\text{SrB}_6$  formed so rapidly that Sr did not volatilize. The yield increased to 87 %. Since reaction I yielded no carbon-free product (0.44 % C at 2000°C), reaction II was studied. Here, a minimum yield of  $\text{SrB}_6$  (62.9 %) was observed at 1600°C due to rapid evaporation of Sr and B. Maximum yield (75.4 %) was obtained at 1800°C, the product being free from C. The following physicochemical data are mentioned: Heat of formation of  $\text{SrB}_6$  = 50.4 kcal/mole; radiation coefficient = 0.79 at  $\lambda = 0.655 \mu$  between 800 and 1800°C. Between 1400 and 2100°C, vapor pressure follows the equation:  $\log p_{\text{mm}} = 6.43 - 21423/T$ . ch

Therefrom, the boiling point of  $\text{SrB}_6$  is calculated to be 5400°C. Heat of sublimation was found to be  $97.2 \pm 3.0$  kcal/mole. For samples pressed at 2100°C and 150 kg/cm<sup>2</sup> (residual porosity about 10 %), the following data were found: Electrical resistivity = 191.8  $\mu\text{ohm}\cdot\text{cm}$  (referred to material free from pores), microhardness = 2900  $\pm 90$  kg/mm<sup>2</sup>. L. Ya. Markovskiy's paper (Zh. prikl. khimii, 32, 1295 (1958)) is mentioned. There are 5 figures, 3 tables, and 14 references: 9 Soviet and 5 non-Soviet. The two references to English-language publications read as follows:

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27096

Synthesis and physicochemical properties...

S/078/61/006/010/003/010  
B101/B226

W. Dutoit, J. Chem. Phys., 24, 111 (1927); E. Jonesan, M. Becker, J. Chem. Soc., 2669 (1927).

ASSOCIATION: Otdel tugoplavkikh materialov Instituta metallokeramiki i spetsial'nykh splavov AN USSR (Division of High-melting Materials of the Institute of Powder Metallurgy and Special Alloys AS UkrSSR)

SUBMITTED: August 5, 1960

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Card 3/3

SEREBRYAKOVA, T.I.

Some characteristics of bud and shoot formation in meadow grasses.  
Biol. MOI. Otd. biol. 66 no.4:42-52 Jl-Ag '61. (MIRA 14:7)  
(GRASSES) (GROWTH (PLANTS))

L 18377-63

EWP(q)/EWT(m)/BDS AFFTC/ASD Pad WH/JD/JW/JG/WB

ACCESSION NR: AP3005003

S/0073/63/029/008/0876/0878

AUTHOR: Serebryakova, T. I.; Samsonov, G. V.

TITLE: Borothermic method for preparing borides <sup>21</sup>

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 29, no. 8, 1963, 876-878

TOPIC TAGS: borothermic method, vacuum, vacuum borothermic method, reduction, refractory, electronics, titanium boride, zirconium boride, chromium boride,  $TiB_2$ ,  $ZrB_2$ ,  $CrB_2$ , boron, heat of formation,  $B_2O_2$ , boride

ABSTRACT: The vacuum borothermic method (G. V. Samsonov, Yu. B. Paderno, Boridy\* redkometal'nykh metallov, Izd-vo AN USSR, K., 1961; G. V. Samsonov, Yu. B. Paderno, Sov. avt. svid. No. 121561, 1959; G. V. Samsonov, Yu. B. Paderno, T. I. Serebryakova, Tsvet. met., 11, 48 (1959); G. V. Samsonov, T. I. Serebryakova, A. S. Bolgar, Zh. neorg. kh., 6, 2243 (1961)) has been used to prepare  $TiB_2$ ,  $ZrB_2$ , and  $CrB_2$  by reduction of ~ 98% pure  $TiO_2$ ,  $ZrO_2$ , and  $Cr_2O_3$  with ~ 98% pure amorphous boron. The oxides were ignited in air at 700C to remove any organic and volatile impurities and moisture. The starting

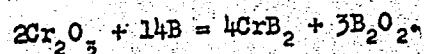
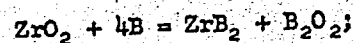
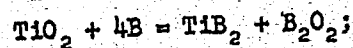
Card 1/2

L 18377-63

ACCESSION NR: AP3005003

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materials were used in ratios based upon the reactions:



Cylindrical briquets 5—8 mm long and 20 mm in diameter were prepared. The briquets were heated in vacuum to predetermined temperatures in a resistance furnace equipped with a boron-containing graphite heater. Chemical analysis showed that formation of  $\text{TiB}_2$  and  $\text{ZrB}_2$  begins at 1100C and goes to completion, with stoichiometric end products, at 1600—1700C. Formation of  $\text{CrB}_2$  begins at 1200C and goes to completion at 1500C. The carbon content of  $\text{TiB}_2$  and  $\text{ZrB}_2$  was 0.02—0.1%, and that of  $\text{CrB}_2$ , 0.01—0.08%. Carbon can likely be eliminated completely by use of metal or noncarbon-containing heaters. The fact that the heat of formation of  $\text{B}_2\text{O}_2$  was 91.8—95.4 kcal/mol, or about the same as that given in the literature, confirmed that  $\text{B}_2\text{O}_2$  is formed rather than boric anhydride. Orig. art. has: 3 figures, 1 table, and 5 formulas.

ASSN: INSTITUTE OF POWDER METALLURGY AND SPECIAL ALLOYS, AN USSR

Card 2/82

SEREBRYAKOVA, T.I. (Moskva)

Structure and activity of the shoot apex. Bot. zhur. 48  
no.5:699-712 My '63. (MIRA 17:1)

SEREERYAKOVA, T.I.

Tillering and clone formation in awnless brome grass (*Bromus inermis*  
Leyss.) Bot. zhur. 49 no.1:39-51 Ja '64. (MIRA 17:2)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut imeni V.I.  
Lenina.

L 4028-66 EWP(e)/EWT(m)/EWP(t)/EWP(k)/EWP(z)/EWP(b) LJP(c) JD/JG  
 ACCESSION NR: AP5022250 UR/0363/65/001/007/1044/1048  
 546.76'271:536.495

54  
 51  
 B

AUTHOR: Lyutaya, M. D.; Serebryakova, T. I.  
 44,55 44,55

TITLE: Thermal stability of chromium borides

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 7, 1965,  
 1044-1048

TOPIC TAGS: chromium compound, boron compound, thermal stability

ABSTRACT: The thermal stability of chromium borides  $Cr_4B$ ,  $Cr_2B$ ,  $Cr_3B_2$ ,  $CrB$ ,  $Cr_3B_4$ , and  $CrB_2$  in the powdered and compact state was studied in air at 500-1000C. It is found that the borides in the powdered form are practically stable when heated in air up to 600C. The lower borides ( $Cr_2B$  and  $Cr_3B_2$ ) oxidize to form chromium oxyborides and chromic oxide.  $Cr_3B_4$  and  $CrB_2$  decompose on oxidation, forming  $Cr_2O_3$  and boric anhydride ( $B_2O_3$ ). The reaction of chromium monoboride with atmospheric oxygen up to 800C forms chromium oxyboride, which decomposes at 900C to form  $B_2O_3$ . The most heat-stable borides in the compact state are chromium monoboride and diboride. The great stability of the monoboride up to 900C is due to an oxyboride film which forms on the sample and decomposes at 900-1000C to form  $B_2O_3$ ; the latter serves as the protective film at these

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L 4028-66

ACCESSION NR: AP5022250

temperatures. The stability of the diboride at high temperatures is due to the formation, upon decomposition of  $\text{CrB}_2$ , of boron oxide, which has high protective properties in the fused state. Orig. art. has: 5 figures and 2 tables.

ASSOCIATION: Institut problem materialovedeniya Akademii nauk UkrSSR (Institute of Materials Science Problems, Academy of Sciences UkrSSR)

SUBMITTED: 11Nov64

ENCL: 00

44.55  
SUB CODE: IC, TD

NO REF SOV: 007

OTHER: 003

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Card 2/2

L 7926-66 EWP(e)/EWT(m)/EWP(i)/EWP(t)/EWP(b) IJP(c) JD

ACC NR: AP5027938

SOURCE CODE: UR/0363/65/001/010/1811/1815

AUTHOR: Serebryakova, T. I.

ORG: Institute of Materials Science Problems, Academy of Sciences, UkrSSR, Kiev  
(Institut problem materialovedeniya Akademii nauk UkrSSR)

TITLE: The nature of chemical bonding in compounds of transition metals with boron

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 10, 1965, 1811-1815

TOPIC TAGS: transition metal, boron compound, chemical bonding, electron structure, electric conductivity

ABSTRACT: The tendency of the boron atom to form a stable covalent bond is manifested in the formation of compounds with transition metal atoms, and in the formation of characteristic boron atom configurations in boride lattices. As in the majority of intermetallic compounds, the superposition of several bond types takes place in borides; this is confirmed by an analysis of the physical properties of boride phases, on the one hand, in going from Ti, V, Cr to Nb, Mo, and W as compared to the properties of the pure metals, and on the other hand, in going from lower to higher borides in which the B/M ratio increases. In terms of electrical conductivity, Nb, Ta, Mo, and W borides are close to carbides. The tendency to

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UDC: 546.271: 541.57

7926-66

ACC NR: AP5027938

form a large number of boride phases increases from Ti, V, and Zr to Nb, Mo, and Ta. It follows that Ti, V, and Zr borides are close in type to electronic phases, whereas Nb, Mo, Ta, and W borides are close to interstitial phases (carbides). The rise in electrical resistance in passing from  $\text{Cr}_2\text{B}$  to  $\text{Cr}_3\text{B}_2$  and to  $\text{CrB}_2$  is due to the fact that as the structural formations of the boron atoms become more complex, part of the conduction electrons become involved in strengthening the B-B bond. In addition, the more complex character of the B-B bonds weakens the screening of the chromium atoms, reducing the carrier mobility and leading to an increased electrical resistance. Orig. art. has: 3 figures and 2 tables.

SUB CODE: IC, GC / SUBM DATE: 05Jul65 / ORIG REF: 004 / OTH REF: 001

  
Card 2/2

L 7925-66

ACC NR: AP5027939

It was found that the electrical conductivity of  $Zr_6O$  and  $Zr_3O$  at high temperatures is described by the equation

$$\sigma = A \exp (-\Delta E / 2kT),$$

where  $\Delta E$  is the forbidden gap width;  $A$ , the preexponential coefficient;  $k$ , Boltzmann's constant;  $\sigma$ , the electrical conductivity; and  $T$ , the absolute temperature.  $\Delta E$  was calculated to be 0.18 and 0.20 for  $Zr_6O$  and  $Zr_3O$ , respectively. These values are not definitive because deviations from stoichiometry are possible in the samples, but they are of fundamental significance in that they demonstrate the presence of a forbidden gap, and hence, the semiconductor nature of  $Zr_6O$  and  $Zr_3O$ . Differences in the bonding types of zirconium and titanium oxides are discussed. Orig. art. has: 3 figures.

SUB CODE: IC, GC / SUBM DATE: 25Mar65 / ORIG REF: 010 / OTH REF: 002

Card 3/3

SEREBRYAKOVA, T.I.

Shoot formation and life forms of some species of meadow  
grass (Poa L.) as related to their evolution. Bot.zhur.  
50 no.11:1536-1555 N '65.

(MIRA 19:1)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut imeni  
V.I.Lenina. Submitted April 16, 1965.

SEREERYAKOVA, T.I.

Life forms of loosely ramified forest and meadow grasses and  
possible trends of their evolution. Biul. MOIP. Otd. biol.  
70 no. 6:60-79 N-D '65 (MIRA 19:1)

ACC NR: AP6034398

SOURCE CODE: UR/0073/66/032/010/1067/1070

AUTHOR: Serebryakova, T. I.

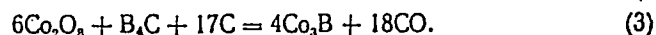
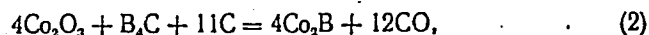
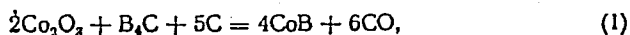
ORG: Institute of Materials Science Problems, AN UkrSSR (Institut problem materialovedeniya AN UkrSSR)

TITLE: Study of the conditions of preparation of cobalt borides

SOURCE: Ukrainskiy khimicheskii zhurnal, v. 32, no. 10, 1966, 1067-1070

TOPIC TAGS: cobalt compound, boride

ABSTRACT: The conditions of preparation of cobalt borides  $\text{Co}_3\text{B}$ ,  $\text{Co}_2\text{B}$  and  $\text{CoB}$  by the boron carbide method were studied by using charges calculated by assuming the occurrence of the following reactions:

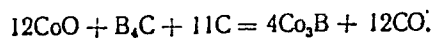


As indicated by x-ray analysis, the reduction products of reactions (1,3) at  $1100^\circ$  and above are  $\text{CoB}$  and  $\text{Co}_3\text{B}$ . The formation of  $\text{Co}_2\text{B}$  is completed at  $1300^\circ$ . All the products were contaminated with carbon. Assuming that  $\text{Co}_3\text{O}_4$  is reduced to  $\text{CoO}$  during heating, the following reaction was studied at  $900-1200^\circ$ :

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UDC: 546.73.271

ACC NR: AP6034398



It was found that when the partial reduction of  $\text{Co}_3\text{O}_4$  during heating to the temperature of the reaction is taken into account, the carbon content in the end product is reduced to 1.5-2%. This method of preparing cobalt boride is recommended when the product does not have to be very pure.  $\text{Co}_3\text{B}$  was also synthesized from the elements at 1050-1100° in argon; the product contained 5.8% boron. Orig. art. has: 4 tables.

SUB CODE: 07/ SUBM DATE: 09Feb65/ ORIG REF: 006/ OTH REF: 003

ACC NR: AP7002400

SOURCE CODE: UR/0363/66/002/012/2134/2138

AUTHOR: Serebryakova, T. I.; Kovenskaya, B. A.

ORG: Institute of Materials Science Problems, Academy of Sciences, UkrSSR (Institut problem materialovedeniya Akademii nauk UkrSSR)

TITLE: Physical properties of boride phases of chromium

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 12, 1966, 2134-2138

TOPIC TAGS: chromium compound, boride, resistivity, thermal expansion, hardness

ABSTRACT: Some physical properties (resistivity, coefficient of thermal expansion, characteristic temperature, microhardness, etc.) of the phases  $\text{Cr}_4\text{B}$ ,  $\text{Cr}_3\text{B}_2$ ,  $\text{CrB}$ ,  $\text{Cr}_3\text{B}_4$  and  $\text{CrB}_2$  (prepared by sintering) were studied. It was found that all the phases studied have mainly a metallic type of conduction. A tendency of the resistivity to decrease with increasing B/Cr ratio was observed. In all cases, there is a certain deviation of the temperature dependence of the resistivity from linearity. A correlation was established between the nature of the change in melting point and the magnitude of resistivity. The coefficient of thermal expansion decreases in regular fashion as the B/Cr ratio increases. The relationships established are satisfactorily ac-

Card 1/2

UDC: 546.76\*271:541.12.03

ACC NR: AP7002400

counted for from the standpoint of the electronic structure of the atoms of the components. Orig. art. has: 3 figures, 1 table and 1 formula.

SUB CODE: 20/ SUBM DATE: 25Nov65/ ORIG REF: 009/ OTH REF: 003

4,

Card 2/2

ACC NR: AP7007799

(A)

SOURCE CODE: UR/0080/67/040/001/0003/0006

AUTHOR: Serebryakova, T. I.; Samsonov, G. V.

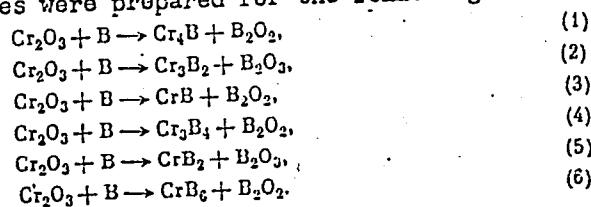
ORG: none

TITLE: Conditions of formation of chromium borides

SOURCE: Zhurnal prikladnoy khimii, v. 40, no. 1, 1967, 3-6

TOPIC TAGS: chromium carbide, boride, chromium oxide, chromium compound

ABSTRACT: In a study of the borothermic method of synthesizing boride phases of chromium, the charges were prepared for the following reactions:



The reduction products were analyzed chemically and by x-ray analysis. By studying the products of reaction (3), it was found that the formation of CrB begins at 1200° and is complete at 1500°. Above this temperature, the product consists of a mixture of CrB and CrB<sub>2</sub>. A study of the conditions of synthesis of CrB in a graphite tube

Card

1/2

UDC: 546.76'271

ACC NR: AP7007799

furnace in a hydrogen medium by the boron carbide method, which involves the reaction  $\text{Cr}_2\text{O}_3 + \text{B}_4\text{C} \rightarrow \text{CrB} + \text{CO}$  (at 1000-2100°), showed that up to 1900° a mixture of CrB (main phase) and  $\text{CrB}_2$  is formed; at 1900° and above, the samples melted. The conditions of synthesis and compositions of the charges for the five synthesized phases ( $\text{Cr}_4\text{B}$ ,  $\text{Cr}_3\text{B}_2$ , CrB,  $\text{Cr}_3\text{B}_4$  and  $\text{CrB}_2$ ) are described. Orig. art. has: 3 figures and 2 tables.

SUB CODE: 07/ SUBM DATE: 08Feb65/ ORIG REF: 004/ OTH REF: 002

Card

2/2

BOGDANOV, A.I.; SERGEYEVA, P.V., SEREBRYAKOVA, T.I., redaktor; TSYPO, R.V.,  
tekhnicheskiiy redaktor; SMIRNOVA, M.I., tekhnicheskiiy redaktor; YETZHINA,  
I.M., korrektor.

[Practical studies in the classification of plants; textbook for students  
in teaching institutes] Prakticheskie zaniatiia po sistematike rastenii;  
posobie dlia studentov uchitel'skikh institutov. Moskva, Gos. uchebno-  
pedagog. izd-vo, 1952. 143 p. (MLRA 6:5)

(Botany--Study and teaching)

SEREBRYAKOVA, T. I.

"Sucker Formation and Seasonal Rhythm of Growth of Plants in the Marshy Meadows of the Central Oka River." Cand Biol Sci, Moscow State Pedagogical Inst, Moscow, 1953. (RZhBiol, No 1, Sep 54)

SC: Sum 432, 29 Mar 55

SEREBRYAKOVA, T. I.

Some peculiarities of shooting in the meadow foxtail (*Alopecurus Pratensis* L.) Bot. zhur. 40 no. 4: 570 J1-Ag'55.  
(Foxtail) (MLRA 8:11)

USSR / Meadow Cultivation

L

Abs Jour: Ref Zhur-Biol., Vol 13, 1953, 58426

Author : Serebryakova, T. I.

Inst : Moscow State Pedagogical Institute

Title : Formation of Sprouts and the Rhythm of Seasonal  
Development of Plants in Water Meadows of the  
Middle Oka

Orig Pub: Mosk. gos. ped. in-t, 1956, 97, 43-120

Abstract: An experiment was conducted on the bottom lands of the Oka River near the village of Dadinovo, Lukhovitskiy Rayon, Moscow Oblast, in which 147 species were studied. Only a small part of the plant descriptions is given. This portion relates to various groups of economic systems and to various

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USSR / Meadow Cultivation

L

Abs Jour: Ref Zhur-Biol., Vol 13, 1958, 58425

forms of life. The description refers principally to the development cycle of an individual monocarpic sprout of an adult plant and the relation between sprouts of various generations in the course of a year. The author feels that this singular biological plant group, namely meadow perennial grasses, originated on bottom land meadows under the influence of ecological conditions and natural grazing. It was also influenced by factors of economic utilization. Meadow cereal grasses represent the most typical expression of biological properties of this group. These are capable of a very prolonged vegetative renewal. They also are capable of active sprouting, which is guaranteed by the presence of many buds of different types opening up at various times. Sprouts

Card 2/4

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USSR / Meadow Cultivation

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Abs Jour: Ref Zhur-Biol., Vol 13, 1958, 58425

days of June. Such relatively late blossoming is related to the condition of the bottom lands (high water). The racemes or the generative part of the sprout are formed in the early spring with respect to the majority of the principal fodder grasses. The period of blossoming is prolonged (one to two months). As a result of these peculiarities of meadow perennials, they can form two and sometimes even more generations of sprouts during the vegetative period. Bibl. 25 titles. - I. S. Shaternikova

Card 4/4

SEREBRYAKOVA, T.I.

Some morphological characteristics of shoot formation in the meadow  
fescue (*Festuca pratensis* Huds). Biul. MOIP. Otd. biol. 64 no.3:89-98  
My-Je '59. (MIRA 13:3)  
(Fescue grass) (Growth (Plants))

SEREBRYAKOVA, T.I.

Two tillering types observed in the awnless brome grass (*Bromus inermis* Leyss.) during its first year of life. Biul. MOIP. Otd. biol. 65 no.5:63-75 S-0 '60. (MIRA 13:12)  
(BROME GRASS) (BOTANY—MORPHOLOGY)

TITOV, Ivan Andreyevich, prof.; SEREHRyakova, T.I., red.; KUZNETSOV,  
P.A., red.izd-va; YEZHova, L.L., tekhn.red.

[Interrelation between plant communities and environmental  
conditions; development of geobotanical systems] Vzaimo-  
deistvie rastitel'nykh soobshchestv i uslovii sredy; problema  
razvitiia georastitel'nykh sistem. Izd.2. Moskva, Gos.izd-vo  
"Vysshaya shkola," 1961. 518 p. (MIRA 14:4)  
(Botany--Ecology)

SEREBRYAKOVA, T.I.

Shoot formation and tillering in gramineous plants. Bot.zhur. 47  
no.3:427-432 Mr '62. (MIRA 15:3)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut imeni  
V.I.Lenina.

(Gramineae)

SEREBRYAKOVA, T.I.

Shoot formation and tillering in the meadow fescue (*Festuca  
pratensis* Huds.) during its first year of life. Biol. MOIP.  
Otd. biol. 67 no.6:81-95 N-D'62 (MIRA 17:7)

SEREBRYAKOV, I.G.; SEREBRYAKOVA, T.I.

Two types of rhizome forming in herbaceous perennials. Biol.  
MOIP. Otd. biol. 70 no.2:67-81 Mr-Ap '65.

(MIRA 18:5)

BULATOV, N.D.; SEREBRYAKOVA, V.G.

Some results of using radio astronomy techniques in the study  
of the solar eclipse of February 15, 1961. Radiotekhnika  
17 no.10:21-24 0 '62. (MIRA 15:9)  
(Radio astronomy) (Eclipses, Solar)

YELIZAROV, G.P.; SEREBRYAKOV, V.I. (Gor'kiy)

Occupational skin diseases caused by DDT and hexachloran.  
Gig. truda i prof. zab. 7 no.3:54-56 Mr'63 (MIRA 17:1)

1. Instytut gigiyeny truda i professional'nykh bolezney,  
Gor'kiy.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
<div style="display: flex; justify-content: space-between;"> <div> <p>COMMON ELEMENTS</p> <p>COMMON</p> <p>MATERIAL INDEX</p> </div> <div> <p>1ST AND 2ND EDITIONS</p> <p>PROCESSES AND APPROPRIATE INDEX</p> <p>ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION</p> </div> <div> <p>20</p> <p>The amount of synthetic rubber used in the U. S. S. R. to replace natural rubber in manufacturing shoe soles and parts of footwear. A. Panova and V. Serebryakova. J. Rubber Ind. (U. S. S. R.) 12, 360-3(1935).—A discussion of different formulas and of the mech. properties of shoe soles and parts of footwear, made partly or wholly with synthetic rubber. A. Pestoff</p> </div> </div>																																																	
<div style="display: flex; justify-content: space-between;"> <div> <p>1ST EDITION</p> <p>2ND EDITION</p> </div> <div> <p>1ST EDITION</p> <p>2ND EDITION</p> </div> </div>																																																	

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<div style="display: flex; justify-content: space-between;"> <div> <p>1. <b>SEREBRYAKOVA, V.L.</b></p> <p>2. <i>Handwritten mark</i></p> </div> <div> <p>3. <b>THE USE OF SYNTHETIC RUBBER IN THE MANUFACTURE OF RUBBER SHOES.</b> O. Baksht and V. Serebryakova. <i>J. Rubber Ind.</i> (U. S. S. R.) 12, 521-2 (1935).—Synthetic rubber up to 34% is used in rubber soles. To increase the adhesiveness of synthetic rubber mixts., mazut (mazut "G" from Groznul) is added as a softener.</p> <p>4. <b>A. Pestoff</b></p> </div> <div> <p>5. <b>30</b></p> </div> </div>																																																																																																																																	
<div style="display: flex; justify-content: space-between;"> <div> <p>6. <b>ASH-LEA METALLURGICAL LITERATURE CLASSIFICATION</b></p> <p>7. <b>547.385.4</b></p> </div> <div> <p>8. <b>547.385.4</b></p> </div> </div>																																																																																																																																	

SOV/138-58-6-10/25  
AUTHORS: Perevezentseva, N.M., Plungian, L.V., ~~Serebryakova, Y.L.~~  
TITLE: Intensifying Processes of Plasticisation and Mixing on  
Roll Mills (Intensifikatsiya protsessov plastikatsii i  
smesheniya na val'tsakh)  
PERIODICAL: Kauchuk i Rezina, 1958, Nr 6, pp 34 - 35 (USSR)  
ABSTRACT: The aim of the investigation was to intensify the  
plasticisation of natural rubber and colouring of  
mixtures whilst working on rollers (temperature of the  
roller = 50° - 60°C) by using non-toxic plasticisers.  
The first stage of the investigation consisted in testing,  
under laboratory conditions, substances recommended by  
NIIR, NIIShP and the Lomonosov NITKhT. (1) Anti-  
oxidants: dimethylphenylparacresol (DMFPA), mercapto-  
benzimidazole (MB), tri-~~tert.~~-butylphenol (P-23), di-~~tert.~~-  
butylhydroquinone (P-20). (2) Vulcanisation accelerators:  
tetramethylthiuramdisulphide (thiuram), peroxide (isc-  
propylbenzene hydroperoxide), chlorinated paraffin, ferric  
stearate, bis- (para-~~tert.~~-butylphenol) disulphide and  
renatsitil. The effect of these various substances was  
tested; however, negative results were obtained.

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SOV/138-58-6-10/25

Intensifying Processes of Plasticisation and Mixing on Roll Mills

Accelerated plasticisation (20 - 30%) was obtained with bis (para-tert.-butylphenol) disulphide. Results (at a temperature of 50° - 60°C) are given in a Table. The effect of the temperature of processing on the plasticisation of natural rubber in the temperature limits of 50° - 120°C was investigated. The plasticity (according to Karrer) was decreased on increasing the temperature, but in all cases the plasticity of natural rubber containing the above named substances was higher than that of untreated natural rubber. A maximum degree of plasticisation of natural rubber was obtained when the rubber was first heated before being fed to the rollers (100°C) and when processing was carried out at 50°-55°C. This was verified on a rubber mixer in the Sverdlovsk plant RTI (10 - 15%). When DMFPK was used, the plasticisation was accelerated by 20 - 30%. The time

Card 2/3

SOV/138-58-6-10/25

Intensifying Processes of Plasticisation and Mixing on Roll Mills

of plasticisation was shortened by 20% when using the substance with heated plasticised rubber, and by 11 - 14% when using it with heated unplasticised natural rubber.

There is 1 Table.

ASSOCIATION: Moskovskiy zavod rezinovykh izdeliy sanitarii i gigiyeny (Moscow Plant for Making Rubber Details for Sanitation and Hygiene)

1. Rubber--Processing    2. Plasticity--Applications    3. Rolling mills  
--Applications    4. Rubber--Test results

Card 3/3

EYDEL'NANT, N.L.; RUBINA, S.I.; SMOLYANITSKIY, V.Z.; SEREBRYAKOVA, V.L.;  
PLUNGIAN, L.V.; DASHKEVICH, V.S.; Prinimali uchastiye:  
PESCHANSKAYA, R.Ya.; LEVINA, A.Yu.; GOL'DBREYKH, I.Ye.;  
SHCHERBAKOVA, L.P.; PAPULOVA, P.A.

Activated kailin and its use in rubber compounding. Kauch.  
i rez. 20 no.9:46-49 S '61. (MIRA 15:2)

1. Nauchno-issledovatel'skiy institut rezinovykh i lateksnykh  
izdeliy, Vsesoyuznyy nauchno-issledovatel'skiy institut plenochnykh  
materialov i iskusstvennoy kozhi i zavod "Sangigiyena".

(Kaolin)

(Rubber, Synthetic)

ACC NR: AP7004394 (A) SOURCE CODE: UR/0226/67/000/001/0031/0036

AUTHOR: Savitskiy, K.V.; Grigor'yeva, V.V.; Kulikov, V.A.; Savitskiy, A.P.; Sergeyenkov, V.M.

ORG: Siberian Physicotechnical Institute im. V.D. Kuznetsov (Sibirskiy fiziko-technicheskiy institut)

TITLE: Investigation of the properties of extruded nickel-aluminum oxide alloy

SOURCE: Poroshkovaya metallurgiya, no. 1, 1967, 31-36

TOPIC TAGS: nickel alloy, ~~dispersion strengthened nickel alloy~~, aluminum oxide ~~containing alloy~~, ~~nickel alloy property~~ powder metal sintering, powder metal compaction, metal extrusion, grain growth, porosity

ABSTRACT:

A mixture of metallic nickel and various amounts of aluminum oxide powders (1—5%) was compacted under a pressure of 15 kg/cm<sup>2</sup> into billets 25 mm in diameter and 35 mm long. One group of billets was sintered in hydrogen atmosphere at 1000°C for 2—3 hr and extruded into bars 10 mm in diameter. Another group was sintered at 1300°C without subsequent extrusion. Specimens, 6.5 mm in diameter and 10.5 mm in length, cut from the billets, were annealed at 700°C for 2 hr. It was found that alloying with aluminum oxide

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UDC: none

ACC NR: AP7004394

prevents grain growth. Extruded specimens, however, had a finer grain and block structure and higher density than sintered billets. Sintered specimens containing 1% aluminum oxide retained up to 6% of their porosity, while the porosity of extruded specimens was practically nil. Alloying with aluminum oxide also increased the compression strength, particularly in the case of extruded alloys. For instance, the deformation pressure for 10% reduction of extruded powdered nickel specimens was  $28 \text{ kg/mm}^2$ , that for sintered nickel alloy specimens (containing 3%  $\text{Al}_2\text{O}_3$ ) was  $43 \text{ kg/mm}^2$ , and that for extruded alloy specimens of the same composition was  $54.5 \text{ kg/mm}^2$ . Orig. art. has: 2 figures and 3 tables. [TD]

SUB CODE: 11/ SUBM DATE: 04Aug66/ ORIG REF: 008/ OTH REF: 001  
 ATD PRESS: 5116

Card 2/2

SEREBRYAKOVA, V.M.

36460. SEREBRYAKOVA, V. M. I KHESINA, A. R.

Profilakticheskaya Flyuorizatsiya Po Lukomskomu V Gal'Vanicheskoy Tsekhe.  
Stomatologiya, 1949, No. 4, S. 28-29.

SO: Letopis' Zhurnal'nykh Statey, Vol. 49, Moskva, 1949

PEREKHODOVA, V.V.; KabanUKA, V.P.

Anticorrosive protection of equipment in carbon black sludge.  
Nauch. i rez. 24 no.12:35-36 '65. (MOSKVA 12.12)

L. Nauchno-issledovatel'skiy konstruktorsko-tekhnologicheskiiy  
institute shimnoy promyshlennosti, g. Omsk.

AYRAPETYANTS, A.V.; VOYTENKO, R.M.; DAVYDOV, B.E.; KRENTSEL', B.A.;  
SEREBRYANIKOV, V.S.

Effect of orientation on the electrical properties of heat-  
treated polyacrylonitrile. Vysokom. soed. 6 no.1:86-88 Ja'64.  
(MIRA 17:5)

1. Institut neftekhimicheskogo sinteza AN SSSR.

S/140/61/000/002/007/009  
C111/C222

AUTHORS: Serebryakova, V.S., and Barbashin, Ye.A.

TITLE: A qualitative investigation of the equations describing the motion of mutually influencing points on the circle

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, no.2, 1961, 137-146

TEXT: The points P and Q with the masses  $m_1$  and  $m_2$  and the angular coordinates  $x$  and  $y$  move on the circle under the influence of the forces  $m_1 f(x)$  and  $m_2 f(x)$ , the frictional forces  $m_1 R_1(x, \dot{x})$  and  $m_2 R_2(y, \dot{y})$  and the mutual force of attraction  $k_1 \psi(y-x)$ . The motion equations read

$$\begin{cases} \dot{x} = u, \\ \dot{u} = -R_1(x, u) - f(x) + k_1 \psi(y-x), \\ \dot{y} = v, \\ \dot{v} = -R_2(y, v) - f(y) - k_2 \psi(y-x), \end{cases} \quad (2)$$

where  $k_i = \frac{L_i}{m_i}$  ( $i=1,2$ ). It is assumed:

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A qualitative investigation...

S/140/61/000/002/007/009  
C111/C222

a)  $f(\eta)$ ,  $\psi(z)$ ,  $R_1(x,u)$ ,  $R_2(y,v)$  are everywhere continuous and in the neighborhood of the singular places of (2) they have continuous partial derivatives;  $f(\eta+2\pi) = f(\eta)$ ,  $\psi(z+2\pi) = \psi(z)$ ;  $R_1(x+2\pi, u) = R_1(x, u)$ ;  $R_2(y+2\pi, v) = R_2(y, v)$ .

b)  $f(\eta_1) = f(\eta_2) = f(0) = 0$ , where  $\eta_1 > 0$ ,  $\eta_2 < 0$  are the zeros of  $f(\eta)$  being nearest to  $\eta = 0$ , and  $\eta_1 - \eta_2 = 2\pi$ . It holds  $\eta f(\eta) \geq 0$  in the neighborhood of  $\eta = 0$  and

$$\int_0^{2\pi} f(\eta) d\eta < 0, \quad f'(0) \neq 0, \quad f'(\eta_1) \neq 0, \quad f'(\eta_2) \neq 0.$$

c)  $R_1(x, 0) = R_2(y, 0) = 0$ ,  $R_1(x, u)$  increasing in  $u$ ,  $R_2(y, v)$  increasing in  $v$ ; for sufficiently large  $|u|, |v|$ :

$$(f(x) + R_1(x, u))u > 0$$

$$(f(y) + R_2(y, v))v > 0.$$

Card 2/9

A qualitative investigation...

S/140/61/000/002/007/009  
C111/C222

d)  $\psi(z) = -\psi(-z)$ ,  $z\psi(z) > 0$  in the neighborhood of  $z = 0$ ;  $k_1, k_2$  -- sufficiently small;  $|\psi(z)| \leq 1$ .

The authors investigate regions of entry of the positions of equilibrium, possible types of motions, criteria for different qualitative courses in the phase planes  $(x, u)$  and  $(y, v)$ , where (2) is replaced by

$$\begin{aligned} \frac{du}{dx} &= \frac{-R_1(x, u) - f(x) + k_1 \psi(y-x)}{u}, \\ \frac{dv}{dy} &= \frac{-R_2(y, v) - f(y) - k_2 \psi(y-x)}{v}. \end{aligned} \quad (5)$$

It is stated that (2) has the singular points  $O(0, 0, 0, 0)$ ,  $M_1(\gamma_1, 0, \gamma_1, 0)$ ,  $M_2(\gamma_2, 0, \gamma_2, 0)$ ,  $M_3(\gamma_1, 0, \gamma_2, 0)$ ,  $M_4(\gamma_2, 0, \gamma_1, 0)$ , where  $O$  is asymptotically stable, the other points, however, are instable of the saddle type. (2) has no limit cycles since the Lyapunov function

$$V = T + \Pi = \frac{m_1 u^2 + m_2 v^2}{2} + m_1 \int_0^x f(x) dx + m_2 \int_0^y f(y) dy + \int_0^{y-x} \psi(z) dz \quad (4)$$

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A qualitative investigation...

S/140/61/000/002/007/009  
C111/C222

has a non-positive derivative  $\frac{dV}{dt} \leq 0$ . For investigating the integral curves of the first equation (5) the authors consider the auxiliary equations

$$\frac{du^-}{dx} = \frac{-R_1(x,u)-f(x)-k_1}{u}, \quad (7)$$

$$\frac{du^+}{dx} = \frac{-R_1(x,u)-f(x)+k_1}{u}, \quad (8)$$

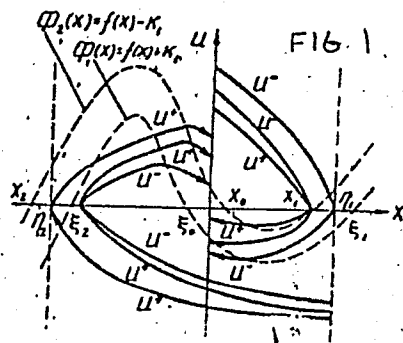
so that the inequalities

$$\frac{du^-}{dx} \leq \frac{du}{dx} \leq \frac{du^+}{dx} \quad \text{for } u \geq 0,$$

$$\frac{du^+}{dx} \leq \frac{du}{dx} \leq \frac{du^-}{dx} \quad \text{for } u < 0 \quad (9)$$

are valid. With the aid of the monotony curves (Ref.3: V.A.Tabuyeva, K voprosu o forme oblasti prityazheniya nulevogo resheniya differentsial'nogo uravneniya  $\dot{x} = f(x, \dot{x})$  [On the question on the form of the region of entry of the zero solution of the differential equation  $\dot{x} = f(x, \dot{x})$ ], Card 4/9

(figure 1)

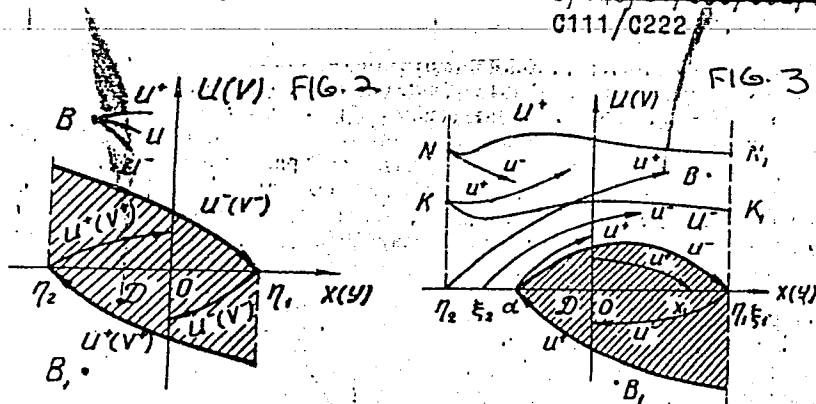


the directional field of the integral curves of the first equation (5) as well as the equations (7), (8) is obtained. The mutual situation of the integral curves  $u$  of (5),  $u^+$  of (8) and  $u^-$  of (7) going through a point is fixed by (9). The figures 2 and 3 show two types of phase images (figure 2 -- first type; figure 3 -- second type).

Card 5/9

A qualitative investigation:

S/140/61/000/002/007/009



Theorem 1: If the point  $A$  lies in the strip  $\eta_2 \leq x \leq \eta_1$ ,  $\eta_2 \leq y \leq \eta_1$  of the phase space and if at least one of its projections onto the planes  $(xu)$  and  $(yv)$  does not lie in the corresponding region  $D$  then  $A$  cannot be attracted to the stable position of equilibrium  $(0,0,0,0)$  without leaving the region  $x \leq \eta_1$ ,  $y \leq \eta_1$ .

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A qualitative investigation...

S/140/51/000/002/007/009  
C111/C222

Case 1: Phase images in  $(x, u)$  and  $(y, v)$  are of the first type.

Case 2: Phase images in  $(x, u)$  and  $(y, v)$  are of different types.

Case 3: Phase images in  $(x, u)$  and  $(y, v)$  are of the second type.

In the case 1, P and Q may carry out fading oscillations around the position of equilibrium. In the case 2, P may carry out a circular motion (rotating), and Q fading oscillations around the position of equilibrium (theorem 2). In the case 3, both points may rotate (theorem 3).  
Let

$$u_0 = \sqrt{2 \int_x^{\eta_1} f(x) dx}; \quad u_1 = u_0 + \int_x^{\eta_1} \frac{R_1(x, u_0) + k_1}{u_0(x)} dx; \quad \checkmark$$

$$z_0 = \sqrt{2 \int_x^{\eta_1} [f(x) - k_1] dx}; \quad z_1 = \sqrt{2 \int_x^{\eta_1} [R_1(x, z_0) + f(x) - k_1] dx};$$

$$v_0 = \sqrt{2 \int_y^{\eta_2} f(y) dy}; \quad v_1 = v_0 + \int_y^{\eta_2} \frac{R_2(y, v_0) + k_2}{v_0(y)} dy;$$

$$r_0 = \sqrt{2 \int_y^{\eta_2} [f(y) - k_2] dy}; \quad r_1 = \sqrt{2 \int_y^{\eta_2} [R_2(y, r_0) + f(y) - k_2] dy}.$$

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Let the system (2) satisfy the conditions a, b, c, d; let exist  $z_1(x)$  for  $\eta_2 < x \leq 0$  and  $r_1(y)$  for  $\eta_2 < y \leq 0$ , let the function

$$R_1(x, u) + f(x) + k_1$$

be non-increasing in  $u$  for  $0 \leq u < \infty$  and  $0 \leq x \leq \eta_1$ ; let

the function  $\frac{R_2(y, v) + f(y) + k_2}{v}$  be non-increasing in  $v$  for  $0 \leq v < \infty$  and

$0 \leq y \leq \eta_1$ . Let  $A$  be the maximal ordinate of the points of

$R_1(x, u) + f(x) - k_1 = 0$ , and let  $B$  be the maximal ordinate of

$R_2(y, v) + f(y) - k_2 = 0$ . Then it holds (theorem 4):

- a) from  $u_0(0) > A$  it follows  $u^-(0) > u^+(0)$ ,
- b) from  $v_0(0) > B$  it follows  $v^-(0) > v^+(0)$ ,
- c) from  $u_1(0) < z_1(0)$  it follows  $u^+(0) > u^-(0)$ ,
- d) from  $v_1(0) < r_1(0)$  it follows  $v^+(0) > v^-(0)$ .

Conclusions: a)+b) is sufficient for the appearance of the first case;

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c)+d) for the third case; a)+d) or b)+c) for the second case.

There are 4 figures and 5 Soviet-bloc references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im.S.M.Kirova  
(Ural Polytechnical Institute im S.M.Kirov)  
Ural'skiy filial AN SSSR (Ural Branch of the Academy of  
Sciences USSR)

SUBMITTED: March 22, 1960

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26460

S/140/61/000/003/006/009

C111/C333

24.4100

AUTHOR: Serebryakova, V. S.

TITLE: On circular motions of connected pendula

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy.. Matematika,  
no. 3, 1961, 103-108

TEXT: The author considers two connected pendula with equal masses,  
the motion of which is described by

$$\begin{cases} \ddot{\varphi}_1 + \alpha \dot{\varphi}_1 + \beta \sin \varphi_1 = k \sin(\varphi_2 - \varphi_1) + L \\ \ddot{\varphi}_2 + \alpha \dot{\varphi}_2 + \beta \sin \varphi_2 = -k \sin(\varphi_2 - \varphi_1) + L \end{cases} \quad (2)$$

where  $\varphi_1, \varphi_2$  are the angular coordinates,  $\alpha, \beta, k, L$  -- constants.

A circular motion is a motion for which the velocities of the pendula  
satisfy the conditions:  $0 < a_1 < u(t) < b_1$  and  $0 < a_2 < v(t) < b_2$

for all 't.

The singular points of system (2) result from

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$$\left\{ \begin{array}{l} x=0, \\ y=0, \\ \sin \varphi_1 = \sin \varphi_2 = \frac{L}{\beta}, \\ \cos \left( \varphi_2 + \frac{1}{2} \arcsin \frac{4kL}{\beta^2} \right) = \cos \left( \varphi_1 + \frac{1}{2} \arcsin \frac{4kL}{\beta^2} \right) = \\ = -\frac{\beta}{2k} \cos \left( \frac{1}{2} \arcsin \frac{4kL}{\beta^2} \right), \\ \sin \left( \varphi_1 - \frac{1}{2} \arcsin \frac{4kL}{\beta^2} \right) = \sin \left( \varphi_2 - \frac{1}{2} \arcsin \frac{4kL}{\beta^2} \right) = \\ = \frac{\beta}{2k} \sin \left( \frac{1}{2} \arcsin \frac{4kL}{\beta^2} \right). \end{array} \right. \quad (4)$$

where  $x = \dot{\varphi}_1$  and  $y = \dot{\varphi}_2$ . It is stated that under the assumption

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$$L < \beta, 4kL < \beta^2, 4k^2 + L^2 > \beta^2 \quad (8)$$

the system possesses 17 singular points. The point  $M_1(0, 0, 0, 0)$  is asymptotically stable, four further points are generalized saddles of first kind. The character of the other points is not given.

As an upper periodic solution of (2) the author denotes a solution  $x = X(\varphi_1, \varphi_2)$ ,  $y = Y(\varphi_1, \varphi_2)$  which satisfies the conditions:

$$X(\varphi_1, \varphi_2) = X(\varphi_1 + 2\pi; \varphi_2 + 2\pi), Y(\varphi_1, \varphi_2) = Y(\varphi_1 + 2\pi; \varphi_2 + 2\pi)$$

$$X(\varphi_1, \varphi_2) \geq 0, Y(\varphi_1, \varphi_2) \geq 0$$

for all  $\varphi_1$  and  $\varphi_2$ . The qualitative investigation of system (2) is carried out with the aid of system

$$\frac{dx}{d\varphi_1} = \frac{-\alpha x - \beta \sin \varphi_1 + k \sin (\varphi_2 - \varphi_1) + L}{x}$$

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$$\frac{dy}{d\varphi_2} = \frac{-\alpha y - \beta \sin \varphi_2 - k \sin (\varphi_2 - \varphi_1) + L}{y} \quad (9)$$

which describes the motion in the phase planes  $x, \varphi_1$  and  $y, \varphi_2$ , and with the aid of two comparison systems obtained from (9) if 1 and -1 are put instead of  $\sin (\varphi_2 - \varphi_1)$ . In the  $x, \varphi_1$ -plane there are obtained the systems

$$\frac{dx^-}{d\varphi_1} = \frac{-\alpha x - \beta \sin \varphi_1 - k + L}{x} \quad (10)$$

$$\frac{dx^+}{d\varphi_1} = \frac{-\alpha x - \beta \sin \varphi_1 + k + L}{x} \quad (11)$$

Theorem 1: If there exists an upper periodic solution in  $\varphi_1$  of (10) and if (8) and

$$L \pm k \leq \beta \quad (13)$$

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 are satisfied, then there exists a periodic solution in  $\varphi_1$  and  $\varphi_2$  of (2).

Theorem 2: For the existence of a periodic solution in  $\varphi_1$  and  $\varphi_2$  of the system (2), where (8), (13) and (14)  $L > k$  are satisfied, it is sufficient that either

$$\alpha \xi_2 + \sqrt{4\beta \sin^2 \frac{\xi_2}{2} + (k-L)\xi_2} > \sqrt{4\beta \sin^2 \frac{\xi_1}{2} + (k-L)\xi_1} + \alpha \xi_1 \quad (15)$$

or

$$2\pi\alpha \leq \sqrt{4\beta \sin^2 \frac{\xi_2}{2} + (k-L)\xi_1} - \sqrt{4\beta \sin^2 \frac{\xi_1}{2} + (k-L)\xi_1} \quad (16)$$

The  $\xi_1$  and  $\xi_2$  are the abscissas of the singular points  $(\xi_1, 0)$ ,  $(\xi_0, 0)$  and  $(\xi_2, 0)$  of (10).

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[Abstracter's note: The paper is not carefully formulated, contains misprints and is difficult to understand without the paper of V. S. Serebryakova, Ye. A. Barbashin (Ref. 1: Kachestvennoye issledovaniye uravneniy, opisyvayushehikh dvizheniye vzaimodeystvuyushchikh tochek po okruzhnosti [Qualitative investigation of equations which describe the motion of points acting on each other on the circle], Izv. vuzov, Matem., No. 2, 1961)].

There are 3 Soviet-bloc references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut imeni S. M. Kirova  
(Ural Polytechnic Institute imeni S. M. Kirov)

SUBMITTED: June 13, 1960

Card 6/6

13,2540

32737  
S/140/61/000/004/010/013  
C111/C222

AUTHORS: Serebryakova, V. S. and Barbashin, Ye, A.

TITLE: On circular motions of connected pendula. II.

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika,  
no. 4, 1961, 112-118

TEXT: The authors investigate the motion of two pendula fastened on a fixed axis with the consideration of the frictional force between the pendula in the point of suspension. The motion equations read

$$\begin{cases} \dot{\Psi} = x, \\ \dot{x} = -\alpha_1 x - \beta f(\Psi) + \gamma_1 F(y-x), \\ \dot{\theta} = y, \\ \dot{y} = -\alpha_2 y - \beta f_1(\theta) - \gamma_2 F(y-x) \end{cases} \quad (5)$$

where  $F$  is the frictional force related to the square of the length of the pendulum 1,  $F(-\omega) = -F(\omega)$ ,  $F(0) = 0$ ,  $F(\omega + 2\pi) = F(\omega)$ ; furthermore it holds  $\beta = \frac{g}{l}$ ,  $\gamma_i = \frac{1}{m_i}$ , the  $\alpha_i$  characterize Card 1/4

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the resistance of the medium,  $f$  and  $f_1$  are periodic functions;

$$f(\Psi) = \sin(\Psi + \varphi_1^0) - \frac{L_1}{\beta}, \quad f_1(\theta) = \sin(\theta + \varphi_2^0) - \frac{L_2}{\beta}$$

$$L_i = \frac{r_i}{m_i l^2}, \quad r_i \text{ -- additional turing force acting onto the pendulum;}$$

$$\Psi = \varphi_1 - \varphi_1^0, \quad \theta = \varphi_2 - \varphi_2^0.$$

At first the authors consider the case  $|F(\dot{\varphi}_2 - \dot{\varphi}_1)| \leq k$ . From (5) the authors form  $\frac{dx}{d\Psi}$  and  $\frac{dy}{d\theta}$  and compare them with the comparison systems

$$\frac{dx^-}{d\Psi} = \frac{-\alpha_1 x - (\beta f(\Psi) - k_1)}{x}, \quad (8)$$

$$\frac{dx^+}{d\Psi} = \frac{-\alpha_1 x - (\beta f(\Psi) + k_1)}{x}, \quad (8')$$

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in the  $x, \Psi$  - plane and with

$$\frac{dy^-}{d\theta} = \frac{-\alpha_2 y - \beta f_1(\theta) - k_2}{y} \quad (9)$$

$$\frac{dy^+}{d\theta} = \frac{-\alpha_2 y - \beta f_1(\theta) + k_2}{y} \quad (9')$$

in the  $y \theta$  - plane. The fact that  $\frac{dx}{d\psi}$  lies between  $\frac{dx^-}{d\psi}$  and  $\frac{dx^+}{d\psi}$  permits the following statement:

Theorem 1: If there exists an upper solution of (8) periodic in  $\Psi$ , and if  $|L_1 \pm k_1| < \beta$ ,  $k_1 = k\gamma_1 > 0$ , or if there exists an upper solution of (9) periodic in  $\theta$ , and if  $|L_2 \pm k_2| < \beta$ ,  $k_2 = k\gamma_2 > 0$ , then one of the pendula performs a circular motion, i. e. for all  $t$  it holds  $0 < a_1 < x(t) < b_1$  or  $0 < a_2 < y(t) < b_2$ .

Theorem 2 contains sufficient conditions that both pendula perform circular motions.

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Finally the authors consider the case where  $F$  means a dry friction; it is shown that the process can be obtained by a putting together of the phase curves of both continuous partial courses and that the theorems 1 and 2 preserve their correctness.

The authors mention N. N. Krasovskiy, V. V. Petrov, G. M. Ulanov, S. A. Chaplygin and M. J. Yel'shin. There are 7 Soviet-bloc references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut, im. S. M. Kirova  
(Ural Polytechnical Institute im. S. M. Kirov)  
Ural'skiy filial AN SSSR (Ural Branch of the Academy of  
Sciences USSR)

SUBMITTED: July 28, 1960

Card 4/4

SEREERYAKOVA, V.S.; BARBASHIN, Ye.A.

Authors' correction to the article "Qualitative investigation of  
equations describing the movement of interacting points on a circle".  
Izv.vys.ucheb.zav.; mat. no.5:127 '61. (MIRA 14:10)  
(Equations) (Aggregates)

SEREBRYAKOVA, V. S., Cand. Phys-Math. Sci. (diss) "Qualitative Investigation of Differential Equations, Describing Movement of System of Interacting Flows Around a Circumference." Sverdlovsk, 1961, 8 pp (Urals State Univ.) 170 copies (KL Supp 12-61, 253).

S/044/62/000/006/014/127  
B112/B104

AUTHOR: Serebryakova, V. S.

TITLE: Qualitative study of the equations for the orbital motion of a system of points

PERIODICAL: Referativnyy zhurnal. Matematika, no. 6, 1962, 53, abstract 6B228 (Tr. Ural'skogo politekhn. in-ta, sb. 113, 1961, 92-102)

TEXT: The orbital motion of a system of  $n$  material points is studied on the assumption that the following forces act on each point: (1) a force proportional to the mass and depending on the position of the point; (2) a reactive force depending on position and velocity; (3) forces of interaction between the points, depending on the distance. Making some additional assumptions, the equilibrium positions are determined, the asymptotic stability of the coordinate origin is proved, the possible cases of the behavior of solutions are discussed, and sufficient criteria for these cases are established. [Abstracter's note: Complete translation.] ✓

Card 1/1

SEREBRYAKOVA, V.S.

Estimation of the region of existence of periodic solutions.  
Izv. vys. ucheb. zav.; mat. no.1:171 '62. (MIRA ~~1962~~)  
(Differential equations)

SEREBRYAKOVA, V.S. (Sverdlovsk)

Evaluation of a region of existence of periodic solutions.  
Izv. vys. ucheb. zav.; mat. no. 5:105-112 '63. (MIRA 16:11)

SIREBRYAKOVA, V.S. (Sverdlovsk)

"On circular motions of the Froude pendulum"

Report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow 29 Jan - 5 Feb 64.

L 58565-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b) JD

ACCESSION NR: AR5013625

UR/0044/65/000/004/B031/B031  
517.933

SOURCE: Ref. zh. Matematika, Abs. 4B159

AUTHOR: Serebryakova, V. S.

TITLE: On the motion of interacting points along a circle in the presence of friction forces

CITED SOURCE: Tr. Ural'skogo politekhnicheskogo in-ta, sb. 139, 1964, 116-120

TOPIC TAGS: particle motion, circular motion, friction force, coupled pendulum, particle dynamics

TRANSLATION: The author investigates the motion of two points on a circle under the following conditions: the points move under the influence of identical forces and are subject in addition to the action of a force that depends on the relative deflection, while the motion of the point is opposed by a nonlinear resistance force and by a friction force that depends on the difference of the velocities of the points. Such a motion is realized physically, for example, by a system of

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ACCESSION NR: AR5013625

coupled pendulums subject to relative friction at the point of suspension. A comparison method is used to obtain the conditions for the existence of circular motions of the points, that is, motions with angular velocity of constant sign. Existence conditions are also obtained for periodic motions. Ye. Barbashin.

SUB CODE: MA, ME

ENCL: 00

dm  
Card 2/2

L 2583-66 EWT(d) IJP(c)

ACCESSION NR: AP5025437

UR/0140/65/000/004/0122/0125  
517.919

AUTHOR: Serebryakova, V. S. (Sverdlovsk)

TITLE: Circular motions of connected Froud pendulums

SOURCE: IVUZ. Matematika, no. 4, 1965, 122-125

TOPIC TAGS: differential equation

ABSTRACT: The author treats

$$\begin{cases} \ddot{x} + \alpha \dot{x} + f(x) = N \operatorname{sign}(\Omega - \dot{x}) + k\psi(\dot{y} - \dot{x}), \\ \ddot{y} + \alpha \dot{y} + f(y) = N \operatorname{sign}(\Omega - \dot{y}) - k\psi(\dot{y} - \dot{x}), \end{cases} \quad (1)$$

where  $f(\eta)$  is an odd periodic function with period  $2\pi$  having two roots on the period ( $f(\pi) = f(0) = 0$ ) and such that  $\eta f(\eta) > 0$  near  $\eta = 0$ , and where the function  $f(\eta)$  has an everywhere continuous derivative  $f'(\eta)$  with two zeros on the period. Analogous conditions are imposed on the function  $\psi(z)$ , and, without loss of generality, she assumes  $|\psi(z)| \leq 1$ . Let  $\alpha, N, \Omega, k$  be positive constants. The above restrictions imposed on the functions and parameters involved in system (1) are called conditions (A). In the particular case of  $f(\eta) = \sin \eta$  system (1) describes the motion of connected Froud-Zhukovskiy pendulums of identical masses.

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ACCESSION NR: AP5025437

The author proves that

$$\begin{cases} \dot{x} = u, \\ \dot{u} = -au - f(x) + N \operatorname{sign}(\Omega - u) + k\psi(v - u), \\ \dot{y} = v, \\ \dot{v} = -av - f(y) + N \operatorname{sign}(\Omega - v) - k\psi(v - u), \end{cases} \quad (2)$$

under (A) and

$$|k - N| > \max f(\eta) \quad (3)$$

always has a periodic solution. In addition another sufficient condition is given for a periodic in x and y solution of (2). Orig. art. has: 15 formulas.

ASSOCIATION: none

SUBMITTED: 27Jan64

ENCL: 00

SUB CODE: MA,  
ME

NO REF SOV: 005

OTHER: 000

Card <sup>11</sup>2/2

SEREBRYAKOVA, Ye.A.

From the experience in the industrial and technical training of  
workers. Tekst.prom. 25 no.1:16-20 Ja '65.

(MIRA 18:4)

1. Starshiy i zh. otдела труда Upravleniya khlopchatobumazhnoy  
promyshlennosti Moskovskogo soveta narodnogo khozyaystva.

NOVIKOV, N.N.; GEPSTEYN, Ye.M.; SEREBRYAKOVA, Ye.K.; GUREVICH, B.S.

Composition of coal tar from the coals of the Kuznetsk Basin. Koks  
i khim.no.8:36-40 '56. (MIRA 10:1)

1.Vostochnyy uglekhimicheskiy institut.  
(Kuznetsk Basin--Coar tar)

NOVIKOV, V.N.; TOLSTOV, L.K.; SEREBRYAKOVA, Ye.K.; SOKOLOV, B.M.; Prini-  
mal uchastiye: Melent'yev, Yu.I.; KAPGER, V.S.; ZORCHENKO, I.F.;  
KARPCV, K.F.; Kushnarenko, V.S.; SHEVCHENKO, L.I.; TRIFONOVA, N.  
I.; PODZHUNAS, V.A.; MASLITSKAYA, M.P.

Obtaining industrial naphthalene from the centrifugal naphthalene  
of the Gubakha Coke and Coal Chemicals Plant. Koks i khim. no.8:  
35-38 '62. (MIRA 17:2)

1. Vostochnyy uglekhimicheskiy institut (for Novikov, Tolstov,  
Serebryakova). 2. Gubakhinskiy koksokhimicheskiy zavod (for Soko-  
lov).

СЕРБЕРЯКОВА, Ye. K.

СЕРБЕРЯКОВА, Ye. K. "The selection of cultures in the form of models for determining the bactericidal properties of disinfectants", Izudy Tsentr. nauch.-issled. dezinfekts. in-ta, Issue 5, 1949, p. 106-08.

SO: U-4631, 16 Sept 53, (Letopis 'Zhurnal 'nykt Statey, No. 24, 1949).

SEREBRYAKOVA, YE. K.

USSR/Medicine - Influenza

Jul 53

"Methods of Infecting White Mice With Influenza Virus," V. I. Vashkov, Ye. K. Serebryakova, Central Sci-Res Disinfection Inst

Zhur Mikro, Epid, i Immun, No 7, p 80

Infection of white mice by dispersion of influenza A virus in the air proved to more certain than intranasal infection. Furthermore, dispersion of the virus in air is of advantage because it permits investigation of the action of disinfectants also dispersed in the air.

267756

~~SEREBRYAKOVA, Ye. K.~~

VASHKOV, V.I.; SEREBRYAKOVA, Ye.K.

Effect of ultraviolet irradiation in influenza virus. Gig. i san.  
no.10:38-42 0 '54. (MLRA 7:11)

1. Iz Tsentral'nogo nauchno-issledovatel'skogo dezinfektsionnogo  
instituta.

(ULTRAVIOLET RAYS, effects,  
on influenza virus)

(INFLUENZA, VIRUSES, effects of radiations on,  
ultraviolet rays)

SEVERYAKOVA, Y. K. Cand Med Sci -- (diss) "Selection and preservation of cultures for testing disinfectants" Mos, 1957. 15 pp 20 cm. (Acad Med Sci USSR), 200 copies. (II, 20-57, 16)

63

ACC NR: AT7009517

SOURCE CODE: UR/0000/66/000/000/0090/0095

AUTHOR: Serebryakova, Ye. N.

ORG: none

TITLE: Electrodynamic current stabilizer

SOURCE: Vsesoyuznoye soveshchaniye po magnitnym elementam avtomatiki i vychislitel'noy tekhniki. 10th, Kaunas, 1964. Magnitnyye elementy promyshlennoy avtomatiki (Magnetic elements in industrial automation); trudy soveshchaniya, pt. 1. Moscow, Izd-vo "Nauka", 1966, 90-95

TOPIC TAGS: stabilizer, automatic regulation, current stabilization

ABSTRACT: An electrodynamic current stabilizer for use in industrial processes is described. The device is a current transformer with a fixed primary and a movable secondary solenoid on a cylindrical core. The core is set at a desired angle to the horizontal in such a manner that the secondary's gravity force is balanced by the primary's repulsive force and the secondary finds a rest position. Any change in input voltage or impedance causes a corrective repositioning of the secondary for rebalance. It can be shown however that the secondary current remains constant as a function of angle over a wide range of input voltage variation. Experiments show that secondary currents will

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UDC: 681.142.324

ACC NR: AT7009517

remain within a few percent of set values for input voltage changes of several hundred volts. Models of the regulator rated at 0.6, 1.5, and 4 kva have been built. Orig. art. has: 4 figures and 4 formulas.[SH]

SUB CODE: 09/ SUBM DATE: none/ ORIG REF: 004

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SOV/144.59-8-11/14

AUTHORS: Bamdas, A.M. (Doctor of Tech. Sci., Professor) and  
Serebryakova, Ye.N.

TITLE: A Variable Auto-transformer with Movable Power Winding

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy,  
Elektrotehnika, 1959, Nr 8, pp 93-101 (USSR)

ABSTRACT: The article opens with a brief review of variable-output transformers and constant-current regulators of the movable coil type. If the input and output voltages of such devices are nearly the same, the auto-transformer connection offers advantages. However, auto-transformers with movable coils are somewhat bulky because of the need to obtain a considerable change in the secondary reactance. The laboratory of the Electrical Machines and Apparatus Faculty of the Gor'kiy Polytechnical Institute has developed a compact variable auto-transformer with a special method of connecting the movable output winding. A schematic circuit diagram of the auto-transformer is given in Fig 2; in principle it is a step-down auto-transformer with an additional movable coil in the secondary circuit. If the secondary voltage is equal to the rated primary voltage it is advisable to connect the additional winding to a tapping on the primary, at about

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A Variable Auto-transformer with Movable Power Winding

70% of the primary turns. The device may be of single or three-phase construction with cylindrical or disc windings. A normal or somewhat elongated shell-type core may be used for the single-phase regulator, as in Fig 3a. Alternatively, it may have built-up core systems as shown in Figs 3b and 3c. The Berry type of core, shown in Fig 3d, is particularly suitable for use in stabilisers, as the counter-balance can be installed internally near the centre. An experimental model of 1.4 kVA output operated satisfactorily. Curves of secondary current, power factor (primary) and efficiency are plotted in Fig 4 as functions of the primary voltage, the secondary current and the primary voltage respectively. A resistive load was used for the tests. The curves show that when the primary voltage alters by  $\pm 20\%$  the secondary current only varies by 1-1.5%. Fig 5 shows a graph of secondary current as a function of supply frequency, which is seen to have little effect. The empirical formulae (1) to (6) obtained for disc windings may be used to design the magnetic system of stabilisers of up to 10 kVA output intended for primary voltage variations of  $\pm 15\%$ . If

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A Variable Auto-transformer with Movable Power Winding

normal transformer steel is used the induction should be about 12000 gauss. Published data on the design of small transformers may be used to design the windings. There are 5 figures and 18 references, of which 9 are Soviet, 4 English, 2 German, 2 Italian and 1 Dutch.

ASSOCIATION: Kafedra obshchey i teoreticheskoy elektrotekhniki i elektricheskikh mashin i apparatov, Gor'kovskiy politekhnicheskii institut (Chair of General and Theoretical Electrotechnology, and Electric Machines and Apparatus, Gor'kiy Polytechnical Institute)(Bomdan)  
Kafedra elektricheskikh mashin, Gor'kovskiy politekhnicheskii institut (Chair of Electrical Machines, Gor'kiy Polytechnical Institute) (Serebryakova)

SUBMITTED: May 24, 1959

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